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EXAMINER	
ABDI, AMARA	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/723,736	AVINASH, GOPAL B.	
	Examiner	**Art Unit**	
	Amara Abdi	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 April 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *11/26/2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

1. Applicant's response to the last office action, filed April 03rd, 2008 has been entered and made of record.

2. In view of the Applicant amendments, the rejection of claims 24-26 under 35 U.S.C 101 is expressly withdrawn.

Remarks

3. Applicant's arguments with respect to claims 1-15 have been fully considered but they are not persuasive.

(a)The Applicant argues that Fritz, Tannenbaum, and wilensky references failed to disclose each element of independent claims 1, 21, and 24. Furthermore, applicant asserts that the Wilensky reference fails to teach or suggest "performing spike noise dependent blending, as recited by independent claims 1, 21, and 24….The Wilensky reference specially defines noise as "a non-local property of an image". In other words, the Wilensky reference discloses blending to reduce non-local noise occurring throughout a blended image. Applicant asserts that the specification clearly differentiate spike noise from non-local noise.

However, in response to applicant's argument, the examiner disagrees because as shown in Figure 1, Step 110, Wilensky et al. clearly teaches the blending of the first image (the data derived from the input image) with the second image (the processed image data) (column 4, line 35-37).

In response to the applicant's arguments that the specification clearly differentiates spike noise from non-local noise, the examiner would like to point out that the claim language is given its broadest reasonable interpretation. The specification in not measure of invention. Therefore, limitations contains therein can not be read into the claims for purpose of avoiding the prior art. Ir re Sporck, 55CCPA 743, 386 F. 2d 924, 155 USPQ 687 (1968). For instant case, the spike noise being different from non-local noise was not claim. Thus any method of blending parameters whether it's not local noise or local spike noise could be read the broad claim.

In response to the applicant's arguments that the Examiner has not pointed to any process thought by Wilensky that could reasonably be correlated to blending data based on the same image data, the examiner would like to point that Wilensky clearly mentioned an example of Clone Stamp tool in Photoshop software, provided by Adobe Systems Incorporated of San Jose, Calif., where blending a portion of an image with another portion of the same image (column 1, line 29-33).

In response to the Applicant's arguments that the Tannenbaum reference does not appear to contemplate the use of spike noise dependent blending, the examiner would like to point out the following precision:

Fritz et al. disclose a method, apparatus (paragraph [0003], line 1-2) and computer program (paragraph 0037], line 1-2) characterizing the spike noise in the input image data (paragraph [0072], line 3-4), (the characterizing the spike noise in the input image data is read as reducing a spike noise in an image). Fritz et al. do not explicitly mention the processing of the input image data by identifying features of interest to

produce processed image data. Tannenbaum et al. teaches the processing the input image data by identifying features of interest to produce processed image data (column 5, line 41-44).

All of the elements are known in references of Fritz et al. and Tannenbaum et al. The only difference is the combination of the processing of the input image with the spike noise characterization.

In addition, the KSR, states: " *All the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yield predictable results to one of ordinary skill in the art at the time of the invention"*

Thus, it would have been obvious to one having ordinary skill in the art to use the processing of the input image as thought by Tannenbaum et al. with the spike noise characterization as shown by Fritz et al. since the processing of the input image data by identifying features of interest could be used in combination with the spike noise characterization to achieve the predictable results of performing segmentation on discrete pixel images, such techniques would be particularly useful in analyzing moving tissues, such as those of the heart (column 2, line 48-55).

In response to the Applicant's arguments that the Fritz reference does not appear to contemplate the use of spike noise dependent blending in any manner, the Examiner would like to point out the following precision:

As discussed above, Fritz et al. disclose a method, apparatus (paragraph [0003], line 1-2) and computer program (paragraph 0037], line 1-2) characterizing the spike

noise in the input image data (paragraph [0072], line 3-4), (the characterizing the spike noise in the input image data is read as reducing a spike noise in an image); and Tannenbaum et al. does teaches the processing the input image data by identifying features of interest to produce processed image data (column 5, line 41-44). To link the Fritz et al. and Tannenbaum et al. references for an undesirable rational, the Examiner has introduced the prior art reference of Wilensky et al. (US 7,171,057). Wilensky et al. teaches the blending of the first image (the data derived from the input image) with the second image (the processed image data) (column 4, line 35-37).

All of the elements are kwon in references of Fritz et al., Tannenbaum et al., and Wilensky et al. The only difference is the combination of the performing of spike noise blending of the first and the second images with the spike noise characterization.

In addition, the KSR states: "*All the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yield predictable results to one of ordinary skill in the art at the time of the invention*".

Thus, it would have been obvious to one having ordinary skill in the art to use the performing of spike noise blending of the first and second image as thought by Wilensky et al. in the characterization of spike noise as shown by Fritz et al., since the spike noise blending of the first and second image could be used in combination with the spike noise characterization to achieve the predictable results of resulting in a faster transition in the high-frequency components and thereby reduce the size of any region

affected by noise cancellation while still allowing a gradual overall transition (column 1, line 64-67).

Therefore, independent claims 1, 21, and 24 and their dependent claims are still not in condition for allowance.

(b) The Applicant argues that Fritz, Tannenbaum, Wilensky, Yu, Nishikawa, and Avinash references collectively fail disclose each element of independent claims 8, 22, and 25. ….Furthermore, none of the Fritz, Tannenbaum, or Wilensky references, taken alone or in hypothetical combination, teach or suggest the act of: “performing spike noise dependent blending of input image data with the processed input image data” as recited in claims 8, 22, and 25.

However, in response to applicant’s argument, the examiner disagrees because as shown in Figure 1, Step 110, Wilensky et al. clearly teaches the blending of the first image (the data derived from the input image) with the second image (the processed image data) (column 4, line 35-37). As discussed above, Fritz et al. disclose a method, apparatus (paragraph [0003], line 1-2) and computer program (paragraph 0037], line 1-2) characterizing the spike noise in the input image data (paragraph [0072], line 3-4), (the characterizing the spike noise in the input image data is read as reducing a spike noise in an image); Fritz et al. do not explicitly mention the processing the input image data by identifying features of interest to produce processed image data. Tannenbaum et al. does teach the processing the input image data by identifying features of interest to produce processed image data (column 5, line 41-44). As discussed above in relation

to independent claims 1, 21, and 24, and their independent claims (see the office Action).

All of the elements are kwon in references of Fritz et al., Tannenbaum et al., Wilensky et al., Yu, Nishikawa, and Avinash. The only difference is the combination of the performing of spike noise blending of the first and the second images with the spike noise characterization.

In addition, the KSR states: "*All the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yield predictable results to one of ordinary skill in the art at the time of the invention*".

Thus, it would have been obvious to one having ordinary skill in the art to use the performing of spike noise blending of the first and second image as thought by Wilensky et al. in the characterization of spike noise as shown by Fritz et al., since the spike noise blending of the first and second image could be used in combination with the spike noise characterization to achieve the predictable results of resulting in a faster transition in the high-frequency components and thereby reduce the size of any region affected by noise cancellation while still allowing a gradual overall transition (column 1, line 64-67).

Therefore, independent claims 8, 22, and 25 and their dependent claims are still not in condition for allowance.

(C) The Applicant argues that Tannenbaum, Hsieh, and Wilensky references collectively fail to disclose each element of independent claims 11, 18, 23, and 26. …Furthermore, none of the Fritz, Tannenbaum, or Wilensky references, taken alone or in Hypothetical combination, teaches or suggests the act of “blending data derived from the input image data with the processed input image data” based upon the likelihood of spike noise, as recited in claims 11, 18, 23, and 26. Additionally, the cited references, taken alone or in hypothetical combination, fail to teach or suggest "blending data....via weighting factors determined based upon the likelihood that the discrete picture elements exhibit spike noise"….However, the Examiner provided no objective evidence for modifying Wilensky to determine weighting factors based upon the likelihood of spike noise…. Furthermore, the Wilensky reference appears to disclose the use of blending parameters based on whether non-local noise exists. As discussed above, this is in contrast to the use weighting factors based upon the likelihood of spike noise, which is local in nature….Moreover, the Tannenbaum reference does not appear to contemplate blending data via weighting factors based upon the likelihood of spike noise in any manner.

However, in response to applicant’s argument that the cited references, taken alone or in hypothetical combination, fail to teach or suggest "blending data....via weighting factors determined based upon the likelihood that the discrete picture elements exhibit spike noise”, the Examiner would like to point out the following precision regarding the combination Tannenbaum et al. and Hsieh references:

Tannenbaum et al. disclose a method (column 8, line 66), system (column 1, line 9-10), and program (column 5, line 27-29) for processing of the input image data by identifying features of interest to produce processed image data (column 5, line 41-44).

Tannenbaum et al. do not explicitly mention the determining of likelihood that discrete picture elements in the input image data exhibit spike noise.

Hsieh teaches the probability that the spike noise will be erroneously considered as high-density objects is determined within the boundary (column 2, line 15-17), (the likelihood is read as probability, and the discrete picture is read as CT imaging).

All the elements are known in Tannenbaum et al. and Hsieh references. The only difference is the combination of the processing of input image data with determining of likelihood that discrete picture elements exhibit spike noise.

In addition, the KSR states: "*All the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yield predictable results to one of ordinary skill in the art at the time of the invention*".

Thus, it would have been obvious to one having ordinary skill in the art to use the determining of the likelihood that discrete picture element exhibit spike noise as thought by Hsieh in the processing input image data as shown by Tannenbaum, since the determining of the likelihood could be used in combination with the processing of image data to achieve the predictable results of providing a correction algorithm which is effective in correcting images for stair case type artifacts in dental scans (column 1, line 58-60).

Regarding the combination of Tannenbaum et al. and Wilensky references, the Examiner would like to point out the following precision:

As discussed above, Tannenbaum et al. disclose a method (column 8, line 66), system (column 1, line 9-10), and program (column 5, line 27-29) for processing of the input image data by identifying features of interest to produce processed image data (column 5, line 41-44); and Hsieh teaches the probability that the spike noise will be erroneously considered as high-density objects is determined within the boundary (column 2, line 15-17), (the likelihood is read as probability, and the discrete picture is read as CT imaging). To link the Tannenbaum et al. and Hsieh references for an undesirable rational, the Examiner has introduced the prior art reference of Wilensky et al. (US 7,171,057). As discussed above (Fig. 1, Step 110, column 4, line 63-66), Wilensky et al. teaches the blending of first image (data derived from the input image) with the second image (processed image) using a weighting factor (column 6, line 17-20), And as mentioned above, the blending of two portions of the same image is the same concept as the blending of two portion of two different images. Furthermore, Wilensky clearly mentioned an example of Clone Stamp tool in Photoshop software, provided by Adobe Systems Incorporated of San Jose, Calif., where blending a portion of an image with another portion of the same image (column 1, line 29-33).

All of the elements are kwon in references of Tannenbaum et al., Hsieh and Wilensky et al. The only difference is the combination of the blending of first and second images using the weighting factor with the processing of the input image data.

In addition, the KSR states: "*All the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yield predictable results to one of ordinary skill in the art at the time of the invention*".

Thus, it would have been obvious to one having ordinary skill in the art to use the blending of first and second images using a weighting factor as thought by Wilensky with the processing of input image data as shown by Tannenbaum et al., since the blending of first and second images using a weighting factor could be used in combination with processing of the input image data to achieve the predictable results of a faster transition in the high-frequency components and thereby reduce the size of any region affected by noise cancellation while still allowing a gradual overall transition (column 1, line 64-67).

In response to the applicant's arguments that the Wilensky reference appears to disclose the use of blending parameters based on whether non-local noise exists…, this is in contrast to the use weighting factors based upon the likelihood of spike noise, which is local in nature; the Examiner would like to point out that the claim language is given its broadest reasonable interpretation. The specification in not measure of invention. Therefore, limitations contains therein can not be read into the claims for purpose of avoiding the prior art. Ir re Sporck, 55CCPA 743, 386 F. 2d 924, 155 USPQ 687 (1968). For instant case, the spike noise being different from non-local noise was not claim. Thus any method of blending parameters whether it's not local noise or local spike noise could be read the broad claim.

In response to the applicant's arguments that the Tannenbaum reference does not appear to contemplate blending data via weighting factors based upon the likelihood of spike noise in any manner, the Examiner disagrees, because as mentioned above, Tannenbaum, Hsieh, and Wilensky references in combination clearly teaches all the elements of the claim.

Therefore, independent claims 11, 18, 23, and 26 and their dependent claims are still not in condition for allowance.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1, 6, 21, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fritz et al. (US-PGPUB 2003/0199762) in view of Tannenbaum et al. (US 6,535,623) and Wilensky et al. (US 7,171,057).

(1) Regarding claims 1, 21, and 24:

Fritz et al. disclose a method, apparatus (paragraph [0003], line 1-2) and computer readable medium encoded with a computer program (paragraph 0037], line 1-2) for accurately determining the intima-media thickness of a blood vessel, where characterizing the spike noise in the input image data (paragraph [0072], line 3-4), (the

characterizing the spike noise in the input image data is read as reducing a spike noise in an image).Fritz et al. do not explicitly mention the following items:

1) the processing of the input image data by identifying features of interest to produce processed image data;

2) performing a spike noise dependent blending of data derived from the input image data with the processed image data based upon the characterization.

(a) Obviousness in view of Tannenbaum et al.

Tannenbaum et al., in analogous environment, teaches a curvature based system for the segmentation and analysis of cardiac magnetic resonance images, where processing the input image data by identifying features of interest to produce processed image data (column 5, line 41-44).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Tannenbaum et al., where processing the input image data by identifying features of interest, in the system of Fritz et al. in order to performing segmentation on discrete pixel images, such techniques would be particularly useful in analyzing moving tissues, such as those of the heart (column 2, line 48-55).

(b) Obviousness in view of Wilensky et al.

Wilensky et al., in analogous environment, teaches an image blending using non-affine interpolation, where the first and second image components are blended together to produce a blended component (Fig. 1, step 110, column 4, line 63-66), (the blending of the image first and second image components is read as the same concept as the

blending of the data derived from the input image data with the processed image data) based upon characterization (column 4, line 35-37), (the characterization of spike noise is read as the same concept as the reducing of noise).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Wilensky et al., where blending the first and second image components, in the system of Fritz et al. because such feature result in a faster transition in the high-frequency components and thereby reduce the size of any region affected by noise cancellation while still allowing a gradual overall transition (column 1, line 64-67).

(2) Regarding claim 6:

Fritz et al. disclose all the subject matter as described in claim 1 above.

Fritz et al. do not explicitly mention the method, where the weighting factor is performed on discrete picture elements determined not to exhibit spike noise, and blending via a least a second weighting factor is performed on discrete picture elements determined to exhibit spike noise.

Wilensky et al., in analogous environment, teaches an image blending using non-affine interpolation, where using the formulas (5): blend = (1-β) I1s+ β I2s (column 7, line 49), with a first weighting factor β varying between (0) to (1) (column 8, line 5), and (I1s and I2s means a non-noise components) on discrete picture elements (paragraph [0001], line 2) (the discrete picture element is read as a pixel) determined not to exhibit spike noise (the exhibit is read as display or show), (if β= 1, Blend= I1s+I2s, witch means a non-noise components (not to exhibit the spike noise). Wilensky et al. is using

also the formula (6): blend= √ (1- β) * I1n+√ β * I2n) (column 7, line 50), with the second weighting factor √ β varying between (0) to (1) (column 8, line 5), and (I1n and I2n means a -noise components) on discrete picture elements (paragraph [0001], line 2), (the discrete picture element is read as a pixel) determined to exhibit spike noise (the exhibit is read as display or show), (if β= 0, Blend = I1n + I2n witch means there is a noise component (to exhibit the spike noise).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Wilensky et al., where blending the first and second image components, in the system of Fritz et al. because such feature result in a faster transition in the high-frequency components and thereby reduce the size of any region affected by noise cancellation while still allowing a gradual overall transition (column 1, line 64-67).

6. Claims 2 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fritz et al., Tannenbaum et al. and Wilensky et al., as applied to claim 1 above, and further in view of Yu et al. (US 6,563,513).

(1) Regarding claim 2:

Fritz et al., Tannenbaum et al. and Wilensky et al. disclose all the subject matter as described in claim 1 above.

Fritz et al., Tannenbaum et al. and Wilensky et al. do not explicitly mention the rank-order filtering of the input image data.

Yu et al., in analogous environment, teaches an image processing method and apparatus for generating low resolution, low bit depth images, where filtering the image valley with the rank order filter (column 3, line 4-7), (the filtering of the image valley with the rank order filter is read as the same concept as the filtering of the input image with the rank order filter).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Yu et al., where filtering the image valley with the rank order filter, in the system of Fritz et al. in order enable efficient compression and transmission of images to mobile devices having low resolution displays (column 1, line 60-62).

(2) Regarding claim 5:

Fritz et al., Tannenbaum et al. and Wilensky et al. disclose all the subject matter as described in claim 2 above. (The blending of the rank order filtered input image data with the processed image data is read as the same concept as the blending of data derived from the input image data with the processed image data based)

Fritz et al., Tannenbaum et al. and Wilensky et al. do not explicitly mention the rank order filtering of the input image data.

Yu et al., in analogous environment, teaches an image processing method and apparatus for generating low resolution, low bit depth images, where filtering the image valley with the rank order filter (column 3, line 4-7), (the filtering of the image valley with the rank order filter is read as the same concept as the filtering of the input image with the rank order filter).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Yu et al., where filtering the image valley with the rank order filter, in the system of Fritz et al. in order enable efficient compression and transmission of images to mobile devices having low resolution displays (column 1, line 60-62).

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fritz et al., Tannenbaum et al. and Wilensky et al., and Yu et al., as applied to claim 2 above, and further in view of Nishikawa et al. (US 5,673,332).

Fritz et al., Tannenbaum et al. and Wilensky et al., and Yu et al. disclose all the subject matter as described in claim 2 above.

Fritz et al., Tannenbaum et al. and Wilensky et al., and Yu et al. do not explicitly mention the computing of an absolute difference between the rank-order filtered input image data and the input image data.

Nishikawa et al., in analogous environment, teaches a computer-aided method for image feature analysis, where computing the absolute difference produced by the combining of the results of erosion and dilatation operation (column 21, line 42-43), (the absolute difference produced by the combining of the results of erosion and dilatation operation is read as the same concept as the computing of an absolute difference between the rank-order filtered input image data and the input image data).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Nishikawa et al., where computing of an

absolute difference, in the system of Fritz et al. in order to provide an automated method and system for providing reliable early diagnosis of abnormal anatomic regions (column 3, line 38-40).

8. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fritz et al., Tannenbaum et al., Wilensky et al., Yu et al., and Nishikawa et al., as applied to claim 3 above, and further in view of Avinash (US-PGPUB 2003/0099405).

Fritz et al., Tannenbaum et al., Wilensky et al., Yu et al., disclose all the subject matter as described in claim 3 above.

Fritz et al., Tannenbaum et al., Wilensky et al., Yu et al., do not explicitly mention the generating of multilevel mask of spike noise likelihood based upon the absolute difference.

Avinash, in analogous environment, teaches CT dose reduction filter with a computationally efficient implementation, where applying a threshold criteria to identify structures. The structures identified are used to generate a structure mask (paragraph [0038], line 4-8), (the generating of structure mask is read as the same concept as the generating of multilevel mask of spike noise likelihood).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Avinash, where forming a threshold mask image, in the system of Fritz et al. because such feature would be robust in its implementation and would address not only the general image processing problems but also those specific to CT imaging (paragraph [0011], line 1-6).

9. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fritz et al., Tannenbaum et al. and Wilensky et al., as applied to claim 1 above, and further in view of Avinash (US-PGPUB 2003/0099405).

Fritz et al., Tannenbaum et al. and Wilensky et al. disclose all the subject matter as described in claim 1 above.

Fritz et al., Tannenbaum et al. and Wilensky et al. do not explicitly mention the shrinking of the input image by a desired factor and interpolating the resulting image to the size of the input image.

Avinash, in analogous environment, teaches CT dose reduction filter with a computationally efficient implementation, where shrinking the input image by a desired factor (paragraph [0048], line 3-7) and interpolating the resulting image to the size of the input image (paragraph [0089], line 1-6).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Avinash, where shrinking of the input image by a desired factor, in the system of Fritz et al. because such feature would be robust in its implementation and would address not only the general image processing problems but also those specific to CT imaging (paragraph [0011], line 1-6).

10. Claims 8, 22, and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fritz et al. (US-PGPUB 2003/0199762) in view of Tannenbaum et al. (US 6,535,623), Wilensky et al. (US 7,171,057), Yu et al. (US 6,563,513), Nishikawa et al. (US 5,672,332), Avinash et al. (US-PGPUB 2003/0099405).

(1) Regarding claims 8, 22, and 25:

Every element of claims 8, 22, and 25 have been addressed with respect to claims 1 to 5. Furthermore, Frits et al. teaches a method, apparatus (paragraph [0003], line 1) and computer readable medium encoded with a computer program (paragraph [0037], line 1-2) regarding the system of claim 22 and the computer program of claim 25.

(2) Regarding claim 10:

Fritz et al., Tannenbaum et al., Wilensky et al., Yu et al., and Nishikawa et al. disclose all the subject matter as described in claim 8 above.

Fritz et al., Tannenbaum et al., Wilensky et al., Yu et al., and Nishikawa et al. do not explicitly mention the structural regions defined by the input image data.

Avinash et al. (US-PGPUB 2003/0099405), in analogous environment, teaches a CT dose reduction filter with a computationally efficient implementation, where the exemplary image includes structural regions (paragraph [0045], line 1-3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Avinash et al., where exemplary image includes structural regions, in the system of Tannenbaum et al. because such feature would be robust in its implementation and would address nor only the general image processing problems but also those specific to CT imaging (paragraph [0011], line 1-6).

11. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fritz et al., Tannenbaum et al., Yu et al., Wilensky et al., Nishikawa et al., Avinash et al., as applied to claim 8 above, and further in view of Nakabayashi et al. (US 7,113,306).

Tannenbaum et al., Fritz et al., Yu et al., Nishikawa et al., Avinash et al., Wilensky et al. disclose all the subject matter as described in claim 8 above.

(the multi-level mask was disclosed before by Avinash et al. (step 116, Fig.5, column 7, line 15-17),

Tannenbaum et al., Fritz et al., Yu et al., Nishikawa et al., Avinash et al., Wilensky et al. do not explicitly mention the encoding of weighting factors for blending the data corresponding the discrete picture elements.

Nakabayashi et al., in analogous environment, teaches an image data processing apparatus and image data processing method, where the mask sets a central value to the weighting of a pixel to be processed in the image data (column 22, line 46-48).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Nakabayashi et al., where the weighting factors are set, in the system of Tannenbaum et al. in order to provide an image data processing apparatus capable of referring to a result obtained by easily carrying out an image processing while maintaining the originality of image data (column 1, line 48-51).

12. Claims 11, 16, 18-20, 23, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tannenbaum et al. (US 6,535,623) in view of Hsieh (US 6,009,140) and Wilensky et al. (US 7,171,057).

(1) Regarding claims 11, 23, and 26:

Tannenbaum et al. disclose a method (column 8, line 66), system (column 1, line 9-10), and computer readable medium encoded with a computer program (column 5, line 27-29) for processing of the input image data by identifying features of interest to produce processed image data (column 5, line 41-44).

Tannenbaum et al. do not explicitly mention the following items:

1) determining a likelihood that discrete picture elements in the input image data exhibit spike noise; and

2) blending data derived from the input image data with the processed image data via weighting factors determined based upon the likelihood that the discrete picture elements exhibit spike noise.

(a) Obviousness in view of Hsieh

Hsieh, in analogous environment, teaches a stair-case suppression for computes tomography imaging, where the probability that the spike noise will be erroneously considered as high-density objects is determined within the boundary (column 2, line 15-17), (the likelihood is read as probability, and the discrete picture is read as CT imaging).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Hsieh, where determining the probability to

reduce the spike noise in the input image data, in the system of Tannenbaum et al. in order to provide a correction algorithm whish is effective in correcting images for stair case type artifacts in dental scans (column 1, line 58-60).

(a) Obviousness in view of Wilensky et al

Wilensky et al., in analogous environment, teaches where the first and second image components are blended together to produce a blended component (Fig. 1, step 110, column 4, line 63-66), (the blending of the image first and second image components is read as the same concept as the blending of the data derived from the input image data with the processed image data) via weighting factors (column 6, line 17-20). (the likelihood that the discrete picture elements exhibit spike noise was described by Hsieh (column 2, line 15-17))

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Wilensky et al., where blending the first and second image components, in the system of Fritz et al. because such feature result in a faster transition in the high-frequency components and thereby reduce the size of any region affected by noise cancellation while still allowing a gradual overall transition (column 1, line 64-67).

(2) Regarding claim 16:

Tannenbaum et al. disclose all the subject matter as described in claim 11 above.

Tannenbaum et al. do not explicitly mention that weighting factor is performed on discrete picture elements determined not to exhibit spike noise, and blending via a least

a second weighting factor is performed on discrete picture elements determined to exhibit spike noise.

Wilensky et al., in analogous environment, teaches an image blending using non-affine interpolation, where using the formulas (5): blend = $(1-\beta)$ I1s+ β I2s (column 7, line 49), with a first weighting factor β varying between (0) to (1) (column 8, line 5), and (I1s and I2s means a non-noise components) on discrete picture elements (paragraph [0001], line 2) (the discrete picture element is read as a pixel) determined not to exhibit spike noise (the exhibit is read as display or show), (if β= 1, Blend= I1s+I2s, witch means a non-noise components (not to exhibit the spike noise). Wilensky et al. is using also the formula (6): blend= $\sqrt{}$ (1- β) * I1n+$\sqrt{}$ β * I2n) (column 7, line 50), with the second weighting factor $\sqrt{}$ β varying between (0) to (1) (column 8, line 5), and (I1n and I2n means a -noise components) on discrete picture elements (paragraph [0001], line 2), (the discrete picture element is read as a pixel) determined to exhibit spike noise (the exhibit is read as display or show), (if β= 0, Blend = I1n + I2n witch means there is a noise component (to exhibit the spike noise).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Wilensky et al., where blending the first and second image components, in the system of Fritz et al. because such feature result in a faster transition in the high-frequency components and thereby reduce the size of any region affected by noise cancellation while still allowing a gradual overall transition (column 1, line 64-67).

(3) Regarding claim 18:

Tannenbaum et al. disclose a system for processing image data comprising:

a memory circuit for storing input image data (column 5, line 46-49);

a processing module for processing the input image data to generate image data (column 5, line 29-30).

Tannenbaum et al. do not explicitly mention the following items:

1) a spike noise blending module configured to determine a likelihood that discrete picture elements in the input image data exhibit spike noise;

2) and to blend data derived from the input image data with the processed image data via weighting factors determined based upon the likelihood that discrete picture exhibit spike noise.

(a) Obviousness in view of Hsieh

Hsieh, in analogous environment, teaches a stair-case suppression for computes tomography imaging, where the probability that the spike noise will be erroneously considered as high-density objects is determined within the boundary (column 2, line 15-17), (the likelihood is read as probability, and the discrete picture is read as CT imaging).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Hsieh, where determining the probability to reduce the spike noise in the input image data, in the system of Tannenbaum et al. in order to provide a correction algorithm whish is effective in correcting images for stair case type artifacts in dental scans (column 1, line 58-60).

(b) Obviousness in view of Wilensky et al.

Wilensky et al., in analogous environment, teaches a system where the first and second image components are blended together to produce a blended component (Fig. 1, step 110, column 4, line 63-66), (the blending of the image first and second image components is read as the same concept as the blending of the data derived from the input image data with the processed image data) via weighting factors (column 6, line 17-20), (the likelihood that the discrete picture elements exhibit spike noise was described by Hsieh (column 2, line 15-17).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Wilensky et al., where blending the first and second image components, in the system of Fritz et al. because such feature result in a faster transition in the high-frequency components and thereby reduce the size of any region affected by noise cancellation while still allowing a gradual overall transition (column 1, line 64-67).

(4) Regarding claim 19:

Tannenbaum et al. disclose a system where the processing module id defined by computer code in an appropriately programmed computer system (column 5, line 29-30).

Tannenbaum et al. do not explicitly mention the blending module.

Wilensky et al., in analogous environment, teaches where the first and second image components are blended together to produce a blended component (Fig. 1, step

110, column 4, line 63-66), (it is read that producing of blended component has a blending module).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Wilensky et al., where using a blending module, in the system of Fritz et al. because such feature result in a faster transition in the high-frequency components and thereby reduce the size of any region affected by noise cancellation while still allowing a gradual overall transition (column 1, line 64-67).

(5) Regarding claim 20:

Tannenbaum et al. further disclose a system, comprising an image acquisition system for generating the input image data (Fig. 8, step 132, column 12, line 64-67).

13. Claims 12 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tannenbaum et al., Hsieh and Wilensky et al., as applied to claim 11 above, and further in view further in view of Yu et al. (US 6,563,513).

(1) Regarding claim 12:

Tannenbaum et al., Hsieh and Wilensky et al. disclose all the subject matter as described in claim 11 above.

Tannenbaum et al., Hsieh and Wilensky et al. do not explicitly mention the rank-order filtering of the input image data.

Yu et al., in analogous environment, teaches an image processing method and apparatus for generating low resolution, low bit depth images, where filtering the image valley with the rank order filter (column 3, line 4-7), (the filtering of the image valley with

the rank order filter is read as the same concept as the filtering of the input image with the rank order filter).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Yu et al., where filtering the image valley with the rank order filter, in the system of Fritz et al. in order enable efficient compression and transmission of images to mobile devices having low resolution displays (column 1, line 60-62).

(2) Regarding claim 15:

Tannenbaum et al., Hsieh and Wilensky et al. disclose all the subject matter as described in claim 12 above. (The blending of the rank order filtered input image data with the processed image data is read as the same concept as the blending of data derived from the input image data with the processed image data based)

Tannenbaum et al., Hsieh and Wilensky et al. do not explicitly mention the rank order filtering of the input image data.

Yu et al., in analogous environment, teaches an image processing method and apparatus for generating low resolution, low bit depth images, where filtering the image valley with the rank order filter (column 3, line 4-7), (the filtering of the image valley with the rank order filter is read as the same concept as the filtering of the input image with the rank order filter).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Yu et al., where filtering the image valley with the rank order filter, in the system of Fritz et al. in order enable efficient compression

and transmission of images to mobile devices having low resolution displays (column 1, line 60-62).

14. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tannenbaum et al., Hsieh, Wilensky et al., and Yu et al., as applied to claim 12 above, and further in view of Nishikawa et al. (US 5,673,332).

Tannenbaum et al., Hsieh, Wilensky et al., and Yu et al. disclose all the subject matter as described in claim 12 above.

Tannenbaum et al., Hsieh, Wilensky et al., and Yu et al. do not explicitly mention the computing of an absolute difference between the rank-order filtered input image data and the input image data.

Nishikawa et al., in analogous environment, teaches a computer-aided method for image feature analysis, where computing the absolute difference produced by the combining of the results of erosion and dilatation operation (column 21, line 42-43), (the absolute difference produced by the combining of the results of erosion and dilatation operation is read as the same concept as the computing of an absolute difference between the rank-order filtered input image data and the input image data).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Nishikawa et al., where computing of an absolute difference, in the system of Fritz et al. in order to provide an automated method and system for providing reliable early diagnosis of abnormal anatomic regions (column 3, line 38-40).

15. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tannenbaum et al., Hsieh, Wilensky et al., Yu et al., and Nishikawa et al., as applied to claim 13 above, and further in view of Avinash (US-PGPUB 2003/0099405).

Tannenbaum et al., Hsieh, Wilensky et al., Yu et al., and Nishikawa et al. disclose all the subject matter as described in claim 12 above.

Tannenbaum et al., Hsieh, Wilensky et al., Yu et al., and Nishikawa et al. do not explicitly mention the generating of multilevel mask of spike noise likelihood based upon the absolute difference.

Avinash, in analogous environment, teaches CT dose reduction filter with a computationally efficient implementation, where applying a threshold criteria to identify structures. The structures identified are used to generate a structure mask (paragraph [0038], line 4-8), (the generating of structure mask is read as the same concept as the generating of multilevel mask of spike noise likelihood).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Avinash, where forming a threshold mask image, in the system of Fritz et al. because such feature would be robust in its implementation and would address not only the general image processing problems but also those specific to CT imaging (paragraph [0011], line 1-6).

16. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tannenbaum et al., Hsieh, and Wilensky et al., as applied to claim 11 above, and further in view of Avinash (US-PGPUB 2003/0099405).

Tannenbaum et al., Hsieh, and Wilensky et al. disclose all the subject matter as described in claim 11 above.

Tannenbaum et al., Hsieh, and Wilensky et al. do not explicitly mention the shrinking of the input image by a desired factor and interpolating the resulting image to the size of the input image.

Avinash, in analogous environment, teaches CT dose reduction filter with a computationally efficient implementation, where shrinking the input image by a desired factor (paragraph [0048], line 3-7) and interpolating the resulting image to the size of the input image (paragraph [0089], line 1-6).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to use the system of Avinash, where shrinking of the input image by a desired factor, in the system of Fritz et al. because such feature would be robust in its implementation and would address not only the general image processing problems but also those specific to CT imaging (paragraph [0011], line 1-6).

Conclusion

17. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Amara Abdi whose telephone number is (571)270-1670. The examiner can normally be reached on Monday through Friday 8:00 Am to 4:00 PM E.T..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on (571) 272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Amara Abdi/
Examiner, Art Unit 2624

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